

Reagent-free online monitoring of patient detoxification during hemodialysis using ATR-FTIR spectroscopy

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At present there is no detailed monitoring of patient detoxification during hemodialysis. The determination of the concentration variation of relevant substances such as glucose or urea is made by taking samples and analyzing them with conventional clinical chemical methods. The technique of attenuated total reflection Fourier-transform infrared (ATR-FTIR) spectroscopy enables the measurement of the concentrations online during the therapy. Therefore the dialysis filter unit is coupled to an ATR flow cell, where the dialysate, which has been in contact with the blood of the patient through a semipermeable membrane, is analysed. The concentration in the dialysate is directly related to the concentration in the blood of the patient. A calibration model, based on multivariate analysis, has been developed from real hemodialysis samples analysed by chemical reference methods and from artificially mixed dialysis samples. The monitoring includes quantitative determination of urea as the lead substance, as well as glucose, creatinine and lactate. The accuracy is therefore only limited by the chemical reference analysis. Preliminary tests with hemodialysis patients demonstrate that detoxification can be clearly monitored [1].

References

[1] A. Roth, F. Dornuf, O. Klein, D. Schneditz, W. Mänteles, *Anal Bioanal Chem* (Manuscript in progress)